

ABSTRACT OF THE DISCLOSURE

The system and method identifies an Algebron™ element, which is a fundamental and indivisible unit of information in an algebraic model of a complex system. The Algebron™ elements that are selected during an iterative process represent the smallest number of such units required to fit the data and representing the minimum number of parameters necessary to fit the properties of the system with a minimum number of elements. Applications of the Algebron™ including economic forecasting and risk management, evaluation of scientific measurement data and industrial control systems. Two practical examples are given. In the first, the Algebron™ method correctly determines the fit of a polynomial signal in noisy data. In an application to financial risk management, a model is constructed of the covariance matrix for returns of financial securities. The complexity of the model is minimized by describing the covariance matrix as a combination of unknown factors and a part that fluctuates independently, which corresponds to the remaining "noise" associated with the data. The Algebron™ model for the covariance matrix is obtained by finding the minimum number of factors with the smaller number of nonzero loading matrix elements which fit the measured data.